

CLAIMS

What Is Claimed Is:

1. A method for positioning a tunneling tip at a spacing of one nanometer from a conducting surface comprising the steps of:
 - depositing a quantity of fullerene C₆₀ on the conducting surface;
 - removing all but a monolayer film of fullerene C₆₀ on the conducting surface;
 - applying an electrical bias to the tunneling tip;
 - moving the tunneling tip toward the conducting surface with the fullerene C₆₀ film between the tunneling tip and the conducting surface;
 - monitoring for conductance between the tunneling tip and the fullerene C₆₀ film; and
 - fixing the position of the tunneling tip with respect to the conducting surface when a said monitoring indicates that the tunneling tip is in contact with the fullerene C₆₀ film.

- 1 2. A removable packaging method for establishing a one nanometer spacing
2 between electrically conducting components comprising the steps of:
3 depositing a monolayer of C_{60} fullerene on a first fixed conductive
4 surface;
5 moving a second conductive surface with an electrical bias adjacent to
6 the first conductive surface at a location where current is transferred to the
7 monolayer of C_{60} fullerene;
8 breaking down the fullerene C_{60} into carbonaceous byproducts;
9 introducing a gas selected to react with the carbonaceous byproducts to
10 form a stable molecular gas; and
11 providing a sacrificial surface to selectively adsorb the stable
12 molecular gas.

- 1 3. A method for inhibiting contact between a tunneling tip and a conducting
2 substrate comprising the steps of:
3 depositing a monolayer of fullerene C_{60} on the conducting substrate;
4 providing the tunneling tip with an electrical bias;
5 moving the tunneling tip to a position adjacent the conducting substrate
6 and fixing the tunneling tip position with respect to the conducting substrate
7 when an electrical current is detected in the fullerene C_{60} monolayer due to the
8 presence of the tunneling tip;
9 energizing the monolayer of fullerene C_{60} to breakup the monolayer

10 into carbonous byproducts; and
11 removing the carbonous byproducts, leaving the tunneling tip fixed at
12 said fixed position.

1 4. A method for separating an electron-donating tunneling surface from an
2 electron-receiving surface at a distance of on nanometer comprising the steps of:
3 establishing a monolayer of fullerene on the electron-receiving surface,
4 where said fullerene has a monolayer thickness of one nanometer;
5 providing an electrical bias on the electron-donating tunneling surface;
6 bringing the electron-donating tunneling surface into contact with the
7 monolayer of fullerene on the electron-receiving surface; and
8 establishing an electrical current between the electron-donating
9 tunneling surface and the electron-receiving surface, said electrical current
10 communicating across the monolayer of fullerene.

1 5. A method for manufacturing a MEMS device with a protective coating
2 comprising the steps of:
3 depositing via sublimation a fullerene layer onto a gold surface of a
4 conducting substrate;
5 providing an electrical bias on a gold-plated tunneling tip;
6 moving the tunneling tip towards the conducting substrate, and monitoring the

conductivity in the fullerene layer;

fixing the position of the tunneling tip when the monitoring of the conductivity in the fullerene layer indicates that the tunneling tip is in contact with the fullerene layer;

applying thermal energy to the fullerene layer after the tunneling tip position has been fixed to break up the fullerene layer into carbon byproducts;

introducing a gas to react with the carbon byproducts to form a carbon based gas; and

adsorbing the carbon based gas onto a prefabricated sacrificial surface leaving a region adjacent the tunneling tip free of fullerene and fullerene byproducts.

6. A carbon based protective padding for a MEMS device, the carbon based protective padding further adapted to accurately and reliably establish a one nanometer spacing between a conducting surface on the MEMS device and a tunneling tip, the carbon based protective padding comprising a film of fullerene C_{60} having a thickness of one molecule, said film located at the conducting surface between the tunneling tip and the conducting surface.